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WIRELESS HEALTH AND ACTIVITY MONITORING DEVICES

MUTHYALA SRAVANTHI[1], D.PRASHANTH[2]

1. Muthyala Sravanthi, M.Tech Student, Megha Institute of Engineering & Technology for Women , Edulabad, Ghatkesar, Ranga Reddy, Telangana, India.

2. D.Prasanth, H.O.D, Associate Professor, Megha Institute of Engineering & Technology for Women , Edulabad, Ghatkesar, Ranga Reddy, Telangana, India.

ABSTRACT *This paper presents a wearable prototype model for Hand gesture recognition system using MEMS which is capable of recognizing eight hand gesture, based on the signal from 3-axes MEMS accelerometer. This system is targeted mainly to help people with speech and hearing disabilities. The accelerations of a hand motion in three perpendicular directions are detected by accelerometers and acceleration values were transmitted to microcontroller. An automatic gesture recognition algorithm is developed to identify individual gestures in a sequence. Finally, the gesture is recognized by comparing the acceleration values with the stored templates. According to recognized gestures, respective commands be displayed on the LCD and same is played through speaker using voice chip.*

Keywords: *Pulse sensor, MEMS accelerometer, Liquid Crystal Display.*

I. Introduction

The main aim the project is to design a system which is used to monitor the patient condition using Bluetooth technology**.** In the previous existing method PC devices used as data acquisition (DAQ) systems we are able to collect vital information about the elderly patients remotely. Existed system which monitors temperature & pulse rate of different patients and immediate action is taken using Bluetooth technology.

The Mobile Hub has many attractive features cheaper price, portable, location awareness, inbuilt touch screen , however on the other side it has also significant limitations compared to a full PC hardware like limited CPU power, memory, storage size and external interface connection support, The Mobile Hub is targeting different functionalities compared to the Home Hub solution due to the smaller screen size and fewer hardware interfaces, and it can extend the usability with additional special features, such as mobility, location awareness and small size. Mobile Hub software is capable to run almost all Bluetooth enabled and Android based Smartphone. In a sudden panic situation an alarm can be activated manually (by the patient) or automatically (by e.g. the accelerometer) with the mobile device. When an alarm signal initiated the central dispatcher is able to acquire location information (based on GSM/GPRS cell information) immediately.

II. System Design Model

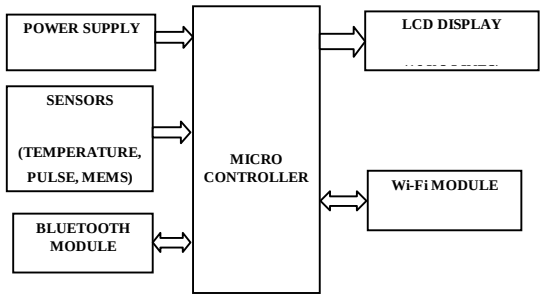

Fig 1. Block diagram for Transimetter

Fig 2. Diagram for receiver

Micro controller: This section forms the control unit of the whole project. This section basically consists of a Microcontroller with its associated circuitry like Crystal with capacitors, Reset circuitry, Pull up resistors (if needed) and so on. The Microcontroller forms the heart of the project because it controls the devices being interfaced and communicates with the devices according to the program being written.

ARM7TDMI: ARM is the abbreviation of Advanced RISC Machines, it is the name of a class of processors, and is the name of a kind technology too. The RISC instruction set, and related decode mechanism are much simpler than those of Complex Instruction Set Computer (CISC) designs.

Liquid-crystal display (**LCD**) is a flat panel display, electronic visual display that uses the light modulation properties of liquid crystals. Liquid crystals do not emit light directly. LCDs are available to display arbitrary images or fixed images which can be displayed or hidden, such as preset words, digits, and 7-segment displays as in a digital clock. They use the same basic technology, except that arbitrary images are made up of a large number of small pixels, while other displays have larger elements.

III. Hardware section

Temperature Sensor: These sensors use a solid-state technique to determine the temperature. they use the fact as temperature increases, the voltage across a diode increases at a known rate. Technically, this is actually the voltage drop between the base and emitter - the Vbe - of a transistor. By precisely amplifying the voltage change, it is easy to generate an analog signal that is directly proportional to temperature. There have been some improvements on the technique but, essentially that is how temperature is measured. Because these sensors have no moving parts, they are precise, never wear out, don't need calibration, work under many environmental conditions, and are consistent between sensors and readings. Moreover they are very inexpensive and quite easy to use.

Fig 3.Temperature sensor

MEMS: Micro-Electro-Mechanical Systems (MEMS) is the integration of mechanical elements, sensors, actuators, and electronics on a common silicon substrate through microfabrication technology. While the electronics are fabricated using integrated circuit (IC) process sequences (e.g., CMOS, Bipolar, or BICMOS processes), the micromechanical components are fabricated using compatible "micromachining" processes that selectively etch away parts of the silicon wafer or add new structural layers to form the mechanical and electromechanical devices. Microelectromechanical systems (MEMS) (also written as micro-electro-mechanical, or MicroElectroMechanical) is the technology of the very small, and merges at the nano-scale into nanoelectromechanical systems (NEMS) and nanotechnology. MEMS are also referred to as micromachines (in Japan), or Micro Systems Technology - MST (in Europe). MEMS are separate and distinct from the hypothetical vision of molecular nanotechnology or molecular electronics. MEMS are made up of components between 1 to 100 micrometres in size (i.e. 0.001 to 0.1 mm) and MEMS devices generally range in size from 20 micrometres (20 millionths of a metre) to a millimetre. They usually consist of a central unit that processes data, the microprocessor and several components that interact with the outside such as microsensors. At these size scales, the standard constructs of classical physics are not always useful. Due to MEMS' large surface area to volume ratio, surface effects such as electrostatics and wetting dominate volume effects such as inertia or thermal mass. MEMS technology can be implemented using a number of different materials and manufacturing techniques; the choice of which will depend on the device being created and the market sector in which it has to operate.

Mems Accelerometer

Accelerometers are acceleration sensors. An inertial mass suspended by springs is acted upon by acceleration forces that cause the mass to be deflected from its initial position. This deflection is converted to an electrical signal, which appears at the sensor output. The application of MEMS technology to accelerometers is a relatively new development. This device works with the capacitance and the changes initiated within it as a result of some accelerative force. This technology is used from automotive industry to agriculture industry and from NASA to military researches and operations.

Pulse sensor: Pulse sensor is also called as Heart Beat Sensor. This heart beat sensor is designed to give digital output of heat beat when a finger is placed inside it. When the heart detector is working, the top-most LED flashes in unison with each heart beat. This digital output can be connected to microcontroller directly to measure the Beats Per Minute (BPM) rate. It works on the principle of light modulation by blood flow through finger at each pulse.

Features

· Heat beat indication by LED

· Instant output digital signal for directly connecting to microcontroller

· Compact Size

· Working Voltage +5V DC

Fig 4 .Pulse sensor

Bluetooth: This is an easy and simple to use Bluetooth SPP (Serial Port Protocol) module. It has a simple serial interface and can be controlled from microcontrollers and computers. It designed for transparent wireless serial connections.

Features

- Standard 3V3 operation
- Bluetooth standard Ver. 2.0 + EDR compliant
- Low current consumption
- Hold, Sniff, Park, Deep sleep modes
- Support for up to seven slaves
- Supports UART,USB,PCM,I2C interface to host system interface
- SPP(Serial Port Protocol) firmware
- Class 2 module

Fig 5. Bluetooth module

Wi-Fi: The reach of wireless communication in embedded systems continues to grow. Forrester Research, a company that focuses on the business implications of technology change, has reported that in a few short years, up to 95% of devices used to access the Internet will be non-PC devices that use an embedded system. There are many applications for embedded devices with a Wi-Fi interface:

• Industrial process and control applications where wired connections are too costly or inconvenient, e.g., continuously moving machinery.

• Emergency applications that require immediate and transitory setup, such as battlefield or disaster situations.

• Mobile applications, such as asset tracking.

• Surveillance cameras (maybe you don't want them easily noticed, cables are difficult to hide).

• Vertical markets like medical, education, and manufacturing.

• Communication with other Wi-Fi devices, like a laptop or a PDA.

Fig 6. Wifi module

IV. Conclusion

The controller programming was implemented using Embedded C. The software used in this project for simulation is Proteus-Lab center Electronics. Advantage of this approach is the potential of mobility. The accelerometer can be used independently with an embedded processor or by connecting wirelessly with mobile devices such as mobile phones or PDAs. For simulated model, input

device is the potential divider (crimp port) instead of MEMS accelerometer, as the accelerometer is not available in this software library. Using this crimp port we can change the acceleration value.

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